

REMARKS

This Amendment responds to the Office Action dated September 9, 2005 in which the Examiner rejected claims 1, 2 and 9 under 35 U.S.C. §102(e), rejected claims 1-6 and 9-13 under 35 U.S.C. §103, objected to claims 7 and 8 as being dependent upon a rejected base claim but would be allowable if rewritten in independent form and stated that claims 14-16 are allowed over the prior art of record.

As indicated above, claims 1, 3 and 13 have been amended in order to make explicit what is implicit in the claim. The amendment is not necessary to distinguish the claims from the cited prior art, and therefore unrelated to a statutory requirement for patentability.

Claims 1 and 3 claim an optical fiber holding device and claim 13 claims an optical dispersion-equalizer. The devices comprise an optical fiber having a grating, a strip-shaped member and a substrate. Claim 3 additionally claims a heater. Claim 13 claims additionally a heater, a heater control circuit, a peltier element, a temperature sensor, a peltier element control circuit and optical circuitry. The strip-shaped member has a rectilinear groove in which the optical fiber is accommodated. A gap is formed between a wall surface of the rectilinear groove and the optical fiber. A gel substance, which remains soft, contacts with the optical fiber and is filled in the gap. The substrate is provided for mounting the strip-shaped member and optical fiber or heater.

Through the structure of the claimed invention having a strip-shaped member having a rectilinear groove in which an optical fiber is accommodated, a gap formed between a wall surface of the rectilinear groove and the optical fiber and a gel

substrate, which remains soft, contacting the optical fiber and filled in the gap as claimed in claims 1, 3 and 13, the claimed invention provides an optical fiber holding device for optical dispersion-equalizer which facilitates positioning the grating of the fiber with respect to the heater and prevent polarization mode dispersion characteristics from being degraded. The prior art does not show, teach or suggest the invention as claimed in claims 1, 3 and 13.

Claims 1, 2 and 9 were rejected under 35 U.S.C. §102(e) as being anticipated by *Chamberlain et al.* (U.S. Patent No. 6,411,746).

Chamberlain et al. is directed to the control of optical properties of an optical fiber device by thermal manipulation. (col. 1, lines 7-9) A thermally tunable optical device includes an optical fiber device 12. (col. 3, lines 55-65) As depicted in FIG. 1, the tunable optical device 10 includes a heater 14. The heater 14 includes a metal layer 18 and a first electrical contact 20 and a second electrical contact 22 that are spaced apart from one another. The metal layer 18 is a thin metallic film coated onto the surface of an optical fiber device 12. (col. 3, lines 55-65) As shown in FIG. 2, the tunable optical device may be mounted to a substrate 42. The optical fiber device 12 is tensioned and attached to a substrate 42 that has two metallized strips 44 forming an assembly 46. The substrate 42 is a zero-expansion material, typically a ceramic, glass or glass-ceramic. (col. 4, lines 27-32) Tensioning the optical fiber device 12 ensures that when the optical fiber device 12 is a fiber Bragg grating that the grating portion 50 of the optical fiber device 12 remains straight throughout the range of operating temperatures. When the optical fiber device 12 is a fiber Bragg grating and the substrate 42 is an ultra-low expansion material, neither the grating temperature nor the ambient temperature influences the total length of the grating

50. (col. 4, lines 36-43) In an alternate embodiment of the invention, as shown in FIG. 3, the heater 14 includes a metal layer 18 deposited on the sides of a groove 34 in a substrate 32. The substrate may be silica, glass or another material chosen to obtain specified thermal response characteristics. Exemplary of this embodiment is the tunable optical device 10 shown in FIG. 4, this embodiment includes a slotted heater 36 in which the substrate 42 is a capillary tube with an axial bore 62 larger than the diameter of the optical fiber device 12. (col. 4, lines 54-63) In a typical embodiment, the region between the metal layer 18 and the optical fiber device 12 is filled with a hybrid organic/inorganic, glass or glass-ceramic material produced by a sol-gel process. (col. 5, lines 13-20)

Thus, *Chamberlain et al.* merely discloses a sol-gel process used to make a glass or glass-ceramic material that fills a region between a metal layer 18 and an optical fiber device 12. In other words, a glass or glass-ceramic material produced by the sol-gel process in *Chamberlain et al.* is a hard material. Nothing in *Chamberlain et al.* shows, teaches or suggests a gel substance which remains soft as claimed in claims 1 and 3. Rather, *Chamberlain et al.* teaches away from the claimed invention since the sol-gel process results in a hard material in *Chamberlain et al.*

Since nothing in *Chamberlain et al.* shows, teaches or suggests a gel substance which remains soft as claimed in claims 1 and 3, applicants respectfully request the Examiner withdraws the rejection to claims 1 and 3 under 35 U.S.C. §102(e).

Claims 2 and 9 depend from claim 1 and recite additional features. Applicants respectfully submit that claims 2 and 9 would not have been anticipated by

Chamberlain et al. within the meaning of 35 U.S.C. §102(e) at least for the reasons set forth above. Therefore, Applicants respectfully request the Examiner to withdraw the rejection of claims 2 and 9 under 35 U.S.C. §102(e).

Claims 1-5 and 9-12 were rejected under 35 U.S.C. §103 as being unpatentable over admitted prior art in view of *Chamberlain et al.*

Referring to FIG. 14, an optical fiber 1 is made of a core and a clad; a grating 2 is formed at a part of the core of the optical fiber and reflects an optical signal of a number of wavelengths; a heater 3 which is made of a thin film for heating the grating to a predetermined temperature distribution; and a substrate 4 which is, for instance, made of quartz and on which the heater 3 is mounted. The grating 2 is used for compensating the wavelength dispersion of a number of optical signals propagated through the optical fiber 1. As shown in FIG. 14, the optical fiber 1 is directly mounted on the heater 3 which is made of the thin film. (page 1, lines 17-28)

Thus, prior art Figure 14 of the specification discloses an optical fiber, a heater and a substrate. Nothing in Applicants' admitted prior art shows, teaches or suggests a strip-shaped member having a rectilinear groove in which an optical fiber is accommodated, a gap formed between a wall surface of the rectilinear groove and the optical fiber and a gel substance, which remains soft, contacting with the optical fiber and filled in the gap as claimed in claims 1 and 3.

As discussed above, *Chamberlain et al.* merely discloses a sol-gel process which forms a hard material. Nothing in *Chamberlain et al.* shows, teaches or suggests a gel substance which remains soft as claimed in claims 1 and 3. Rather, *Chamberlain et al.* teaches away from the claimed invention and forms a hard substance.

Since nothing in applicants' admitted prior art nor *Chamberlain et al.* shows, teaches or suggests a gel substance which remains soft as claimed in claims 1 and 3, applicants respectfully request the Examiner withdraws the rejection to claims 1 and 3 under 35 U.S.C. §103.

Claims 2, 4-5 and 9-12 depend from claims 1 and 3 and recite additional features. Applicants respectfully submit that claims 2, 4-5 and 9-12 would not have been obvious within the meaning of 35 U.S.C. §103 over Applicants' admitted prior art and *Chamberlain et al.* at least for the reasons set forth above. Therefore, Applicants respectfully request that the Examiner withdraw the rejection of claims 2, 4-5 and 9-12 under 35 U.S.C. §103.

Claims 6 and 13 were rejected under 35 U.S.C. §103 as being unpatentable over admitted prior art in view of *Chamberlain et al.* and further in view of *Lauzon et al.* (U.S. Patent No. 5,671,307).

As discussed above, Applicants' admitted prior art and *Chamberlain et al.* do not show, teach or suggest, either singularly or in combination, an optical fiber, a heater, a substrate and a strip-shaped member having a rectilinear groove in which an optical fiber is accommodated, a gap formed between a wall surface of the rectilinear groove and the optical fiber and a gel substance, which remains soft, contacting with the optical fiber and filled in the gap as claimed in claim 13. Rather, the combination of *Chamberlain et al.* and the admitted prior art would merely suggest to form the substrate 4 of prior art Fig. 14 with the V-shaped grooved substrate 32 of *Chamberlain et al.*, and to interpose a hard glass material between the fiber and the substrate. Thus nothing in the references show, teach or suggest a

substrate, heater, optical fiber, strip-shaped member and gel substance, which remains soft, as claimed in claim 13.

Lauzon et al discloses apparatus and a method for chirping a grating using a temperature gradient. (col. 1, lines 8-9) More particularly, it discloses positioning an optical fiber 1 in a groove 4 of a brass plate 3 which is heated by peltier effect plates 6, 7, 11 and 12. Nothing in *Lauzon et al.* shows, teaches or suggests a strip-shaped member having a rectilinear groove in which optical fiber is accommodated, a gap formed between a wall surface of the rectilinear groove and the optical fiber and a gel substance, which remains soft, contacting with the optical fiber and filled in the gap, as claimed in claim 13. Consequently, the proposed combination of Applicants' admitted prior art, *Chamberlain et al.* and *Lauzon et al.* does not teach or suggest the subject matter claimed in claim 13. Therefore, Applicants respectfully request that the Examiner withdraw the rejection of claim 13 under 35 U.S.C. §103.

Claim 6 depends from claim 3 and recites additional features. Applicants respectfully submit that claim 6 would not have been obvious within the meaning of 35 U.S.C. §103 over Applicants' admitted prior art, *Chamberlain et al.* and *Lauzon et al.* at least for the reasons set forth above. Therefore, Applicants respectfully request that the Examiner withdraw the rejection to claim 6 under 35 U.S.C. §103.

Since objected to claims 7 and 8 depend from allowable claims, Applicants respectfully request that the Examiner withdraw the objection thereto.

Thus it now appears that the application is in condition for reconsideration and allowance. Reconsideration and allowance at an early date are respectfully requested. Should the Examiner find that the application is not now in condition for

allowance, applicants respectfully request the Examiner enters this Amendment for purposes of appeal.

If for any reason the Examiner feels that the application is not now in condition for allowance, the Examiner is requested to contact, by telephone, the Applicants' undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed within the currently set shortened statutory period, Applicants respectfully petition for an appropriate extension of time. The fees for such extension of time may be charged to our Deposit Account No. 02-4800.

In the event that any additional fees are due with this paper, please charge our Deposit Account No. 02-4800.

Respectfully submitted,

BUCHANAN INGERSOLL PC

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